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CHINA REPORT

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CONTENTS

PEOPLE'S REPUBLIC OF CHINA

APPLIED SCIENCES

New Transistorized Pulse Power Supply for Electromachining Developed
(BEIJING RIBAO, 10 Dec 81) 1

Technological Alliance Used To Promote Development of Production
(SHAANXI RIBAO, 4 Dec 81) 2

Briefs
Nanhai Seismographic Testing 4
Electronics Research Management 4

HONG KONG MEDIA ON CHINA

China Launches Electromagnetic Rocket
(Ku Chin-hsin; WEN WEI PO, 16 Jan 82) 5

ABSTRACTS

ENGINEERING

TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY], No 4, 1981 8

GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA], No 4, 1981 ... 16

ENGINEERING SURVEYING

GONGCHENG KANCHA [ENGINEERING SURVEYING], No 6, 22 Nov 81 22

GEOLOGICAL WORK

DIXIE GONGCHENG [UNDERGROUND ENGINEERING], No 11, 11 Nov 81 23

INSTRUMENTATION

YIQI YU WEILAI [INSTRUMENTATION AND FUTURE], No 11, Nov 81 24

MACHINERY

JIXIE ZHIZAO [MACHINERY], No 11, 20 Nov 81 25

MACHINE TOOLS

JICHUANG [MACHINE TOOL], No 12, Dec 81 26

PRINTING TECHNOLOGY

YINSHUA JISHU [PRINTING TECHNOLOGY], No 6, Dec 81 27

SEMICONDUCTORS

BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR], No 1, 1982 ... 28

NEW TRANSISTORIZED PULSE POWER SUPPLY FOR ELECTROMACHINING DEVELOPED

Beijing BEIJING RIBAO in Chinese 10 Dec 81 p 2

[Article: "New Transistorized Pulse Electric Power Supply Developed"]

[Text] A new product of our country's electromachining industry, the JDS transistorized pulse power supply, has been jointly developed by the Beijing Municipal Research Institute of Electromachining and the Huanyuan Electric Spark Machining Tools Plant, Beijing. The versatility and production standards of this power supply are at an advanced domestic and international level. This new product passed its technical evaluation on 16 November.

Electric spark machining is a new type of process in which a pulse electrical discharge causes erosion of the material of the workpiece. As the national economy has developed, requirements for electric spark machining of workpieces have increased steadily, and in particular the appearance of large numbers of new products and the utilization of various new materials and new types of steels in industry have created a pressing need in many industries for a stable, reliable, versatile electric spark machining power supply. Last April the Municipal Institute of Electromachining and the Huanyuan Electric Spark Machine Tools Plant created a new pulse power supply development group. This group visited several research and production units in this country, analyzed the direction of development of domestic and foreign pulse power supplies for electric spark machining, and drew up a design proposal for a new transistorized pulse power supply on the basis of actual domestic needs. After much experimentation, this February the first medium-sized model was machine tool fabricated. At the end of more than half a year's industrial testing and evaluation this model proved to have a machining speed greatly exceeding design requirements and greatly decreased electrode consumption.

This electric spark machine tool, based primarily on transistorized pulse circuitry, not only can machine superhard, supertough, high-precision, high-temperature materials and precision microcomponents, but also has high versatility, as a result of which it has been welcomed by users.

8480
CSO: 4008/57

APPLIED SCIENCES

TECHNOLOGICAL ALLIANCE USED TO PROMOTE DEVELOPMENT OF PRODUCTION

Xian SHAANXI RIBAO in Chinese 4 Dec 81 p 1

/Article by Staff Commentator: "Technological Alliance Is an Effective Way To Promote the Development of Production"/

/Text/ Technological alliance between factories and scientific research departments and units is an effective way to promote the development of enterprises.

As readjustment of the national economy deepens, factories that want to continually adapt their own production to social needs and changes in market trends must continuously readjust and reform the product structure, analyze the needs of foreign and domestic markets, select new products that are suited for them to develop according to their own practical possibilities, and determine the direction of development of their business. It is difficult to do these jobs well by relying on one's own strength. They require ideas from experts and specialists to serve as advisers. They require scientific and research departments and units to provide new scientific and research achievements in time to help tackle the key problems. Thus, technological alliance between factories and scientific research departments has been included in the agenda. As the scientific research departments and units see it, to enable their own achievement to quickly develop its function in building the four modernizations and in truly serving production, they also urgently need to join hands with factories. Therefore, technological cooperation and alliance between factories and scientific research departments and units have become the major trend and a necessity.

Technological alliance is mutually stimulating for both parties of the alliance. It enables the scientific research departments and units to continuously obtain new subjects, to be in touch with the practical on a broad basis, to persist in The direction of allying with production, and to constantly add new vitality to scientific research work. It also enables factories to widen their views, to look far ahead, to continuously discover new situations, to emphasize and utilize new technology and new results, and to advance towards the depths and the breadth of production so that the subjective mobility of the factories can be further developed and the persistent development of technological alliance can be promoted.

The field of technological alliance is broad and the forms can be of many types. The Northwest Second Synthetic Pharmaceuticals Plant developed from a single product enterprise to a diversified enterprise. It developed from the alliance of a few units in one aspect to an alliance of many units in several aspects.

Even in one new product, there are three to four forms of alliance. Therefore, every plant can create more new forms and better forms of alliance by closely linking itself with the practical situation and by following the principle of mutual benefits based on the characteristics of its own profession and the characteristics of its products.

Realizing technological alliance well first requires a good ideological foundation. We are socialist enterprises and departments. The purpose of alliance is to develop production. In the alliance, we must advocate the concept of the whole situation, develop the spirit of socialist cooperation, provide conveniences for each other, and take the initiative in creating all kinds of favorable conditions for the other side. The two sides of the alliance must be bound by economic restraints, they must have authority and duties, they must clearly establish responsibilities to avoid disputes. Those simplistic economic views, departmentalism and ways that are detrimental to technological alliance must be opposed. Problems that emerge in alliance should be solved through full negotiation.

To carry out technological alliance well, the support and guidance of the higher authorities and administrative departments are very important. The leadership at each level should take the leadership of the pharmaceutical industry system as the model. It should delve deeply into the actual situation to investigate and study, to clinch the deal in time, to build the bridge and pave the way for both sides of the alliance, to help solve difficulties, to provide enthusiastic support in manpower and materials, and to provide a forceful guarantee for technological alliance in organization.

9296
CSO: 4008/56

APPLIED SCIENCES

BRIEFS

NANHAI SEISMOGRAPHIC TESTING--The Department of Earth Sciences of the Chinese Academy of Sciences recently conducted the first ocean-bottom seismographic test at a Nanhai location. Using a foreign-made satellite guidance and a Chinese-made ocean-bottom seismograph, the "Experiment II" of Nanhai Oceanography Institute successfully carried out this testing project. Ocean-bottom seismograph is a new tool for ocean and geophysical exploration developed in foreign countries in the 1950's. Because the apparatus is placed at the bottom of the ocean, it can not only record the natural occurrence of earthquake at sea but can also conduct long distance exploration of deep crust structure using artificial earthquake source. The objectives of this ocean-bottom seismographic test are: testing of single-vessel dropping and recovery, tracking of facuit in shallow sea and continental shelf region, evaluating the long distance reception performance and obtaining deep crust seismic signals. During the experiment, dropping and recovery were carried out smoothly, orientation and guidance were determined accurately and artificially stimulated seismic signals were recorded. [Text] [Guangzhou YANGCHENG WANBAO in Chinese 10 Dec 81 p 1] 9698

ELECTRONICS RESEARCH MANAGEMENT--In order to correct the weaknesses in the management of scientific research, institutes of the Chinese Academy of Electronics Technology recently held a meeting for their directors and party committee secretaries in which serious discussions were conducted regarding the improvement of economic management of research institutes. Through the discussion, the directors and party committee secretaries have recognized that scientific research units cannot do without administrative management, democratic management, political ideological work and economic management. The planning must be strengthened in order to achieve more with less. Directors and secretaries should have the following three items of information when they spend money: (1) how much money the major research projects need and how much fund is allocated by the state, (2) how are these funds spent, and (3) what are the results of the spending. The directors and secretaries should have an accurate handle on the economic activities, make the capital turnover as fast as possible and reduce the consumption of manpower and material. The meeting requested all the institutes in the Academy to adopt across-the-board economic accounting beginning 1 January 1982. The principal contents of the accounting are: accounting of research results, including quantity, quality and progress, accounting of consumption, including material, fuel and components of external origin and the accounting of fixed asset utilization and research work time; accounting of subject product costs, including total cost and unit cost targets and actual cost expense, accounting of funds, including budget, special funds, material turnover and fixed funds; and accounting of research proceeds, including profit plan, rate of return and the distribution of gains. [Text] [Beijing GUANGMING RIBAO in Chinese 29 Dec 81 p 1] 9698

CSO: 4008/51

CHINA LAUNCHES ELECTROMAGNETIC ROCKET

HK190727 Hong Kong WEN WEI PO in Chinese 16 Jan 82 p 2

[Special feature by Ku Chin-hsin [0657 6930 2450]: "The Launching of Electromagnetic Rockets is Remarkably Unusual"]

[Text] Following the "launching of a trio of satellites by one launch vehicle," China has announced its success in testing electromagnetic rockets.

What is noteworthy is that a XINHUA News Agency report on this success did not give the date of the launching of these rockets. On the day the report was issued, China saw off U.S. special envoy John Holdridge and Renmin Ribao carried a XINHUA News Agency article which denounced the United States for "going too far." These things are very unusual and have profound implications.

The U.S.'s reason for "going too far" is that the pro-Taiwan faction in the United States has underestimated China. This faction is of the opinion that in order to oppose the Soviet Union, China must be servile to the United States, accept U.S. insults and make concessions to the United States. Some people even deem that Chinese protests and warnings against U.S. arms sales to Taiwan are nothing but swashbuckling shows and that if the United States really sells arms to Taiwan, Beijing would be unable to do anything.

This type of hegemonist standpoint shows that some people in the United States are still taking the antiquated imperialist view and belittling China.

It is necessary for China to open the eyes of certain politically blind people so they can get a clear picture of China's current strength.

In his talk on the global strategic situation which was given on the day the U.S. special envoy left Beijing, Wu Xiuquan, deputy chief of general staff of the PLA, noted: The Soviet strategic target is Western Europe and not Asia. If the Soviet Union launches an offensive, the Chinese PLA will be able to withstand a conventional offensive launched against China's northern frontier.

In the world today, people always seem to speak from a position of strength. Certain Western politicians were born with the "eyes of a white pigeon." You must not treat them with gentleness, cordiality, respect, temperateness and politeness, otherwise they will think that you have no real ability and learning, will regard you as negligible, will deem that you are looking to them for help and will therefore bully you.

The launching of Chinese electromagnetic rockets is a show of strength. At present, the so-called multiple-warhead missiles and the so-called killer satellites are toys which have been monopolized by the U.S. hegemonist and the Soviet hegemonist. Electromagnetic rockets are designed for use on missiles and satellites to ensure that they are correctly put into orbit and that their flight paths are correctly adjusted. Compared with conventional miniature liquid hydrogen propellant rockets, an electromagnetic rocket has a greater specific impulse and a longer life, greater maneuverability and easier manipulation. Therefore, compared with conventional miniature rockets, electromagnetic rockets used on killer satellites, space shuttles and guided missiles show a much higher level of emotional accuracy.

Applying this technology to multiple-warhead missiles may greatly improve such missiles' percentage of hits; applying this technology to reconnaissance satellites or killer satellites may provide greater control over such satellites flying orbits and speeds and prolong such satellites flying lives.

China has developed its electromagnetic rockets through self-reliance, the launching of these rockets shows China's three scientific and technological achievements:

1. China has made a breakthrough in electromagnetic rocketry. First of all, these rockets require electricity as a source of energy and lots of it. This is the most difficult problem in producing an electromagnetic rocket. Generally speaking, a pound of thrust requires 50,000 watts of electricity; it is very remarkable to have a 50-pound generator which can generate 1,000 wats of electricity. A heavy generator and a heavy electromagnetic rocket cannot meet the needs for easy manipulation, a longer operational life and greater maneuverability. The XINHUA report did not mention whether the Chinese rockets used solar energy or nuclear energy to generate electricity. In a word, the correct operation of the Chinese rockets in space involves recondite technology.

2. The development of the ion rocket and the ionic propellant industry in China have attained new levels. Selenium is the most appropriate element for making an ionic propellant. As a matter of fact, selenium is dispersed throughout the natural world and its extraction is not an easy task. These things indicate that the Chinese metallurgical industry is relatively advanced. To produce ions, this engine requires a powerful electromagnetic field for extracting electrons from atoms, turning them into ions, accelerating the ions and converting the accelerated ions into thrust this process requires advanced electrophysical technology.

3. There have been further improvements in China's remote-control technology and computer technology. An electric rocket starts working in space after the launching of an astronavigational carrier with a chemical propellant rocket. After this, ground remote-control systems and computer systems accurately monitor the flight of the astronavigational carrier, issue orders, control the functions of the rocket in space including starting, turning off, accelerating, decelerating, changing direction and yaw to ensure that changes in the astronavigational carrier's flight and orbit are made in accordance with the intentions of the ground command station.

The West has always deemed that China has only the powerful chemical propellant rockets to launch an astronavigational carrier, that China lacks accurate electro-

[illegible] [illegible], and that China is seriously behind in developing accurate control systems and precision in space flight. Therefore, the Chinese nuclear weapon's percentage of hits is greatly inferior to those of the two superpowers. Now, China has made these people to understand the meaning of a Chinese idiom: "Having eyes but failing to see Taishan Mountain." Their estimation was utterly wrong.

In the world today, there are still some politically blind people who regard today's mighty dragon of the East as the sick man of East Asia a century ago. They have underestimated China's strength. They should change their old way of thinking which is out of keeping with the times.

CSO: 4020/92

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TITLE: "A Unified Method of Analysis for the Column Settling Test"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 1-6

TEXT OF ENGLISH ABSTRACT: The column settling test is currently used for settling analysis for dilute suspensions. Theoretical settling efficiency of horizontal sedimentation tanks can be estimated. The analysis method was first suggested by Camp for discrete-particle suspensions and then extended by Eckenfelder and O'Connor for flocculant suspensions. Their analyses are both based on settling velocities of suspended particles.

Discrete particles settle in constant velocities and flocculant particles in increasing velocities. Therefore, the analysis method is somewhat different for the two types of sedimentation.

However, the settling column can simulate plug flow or ideal horizontal sedimentation tank directly. By analyzing the column settling test data, the average concentration of the settled suspension can be obtained and then the settling efficiency can be estimated easily. While this method of analysis is applicable to

[Continuation of TONGJI DAXUE XUEBAO No 4, 1981 pp 1-6]

both types of sedimentation, it is much simpler than the current method for flocculant suspensions.

It might also be applied to designing the secondary sedimentation tank of the activated sludge process. It seems possible to estimate underflow concentration and sludge return ratio for given tank depth and detention time.

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TITLE: "Seismic Analysis of a Five-story Concrete Block Masonry Building"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 7-14

TEXT OF ENGLISH ABSTRACT: In order to study the seismic resistance of concrete block masonry housing, a full-scale five-story building subjected to lateral loading was tested in Shanghai two years ago. A brief introduction of experimental work is given in this paper.

Research work in connection with this paper includes the following:
1. The approach of evaluating the seismic resistance of concrete block buildings was discussed:
2. Based on test data the restoring force model was proposed;
3. The seismic responses of the concrete block building were studied;
4. The seismic resistance of the full-scale concrete block building was presented.

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TITLE: "Numerical Analysis of Framed Structure-foundation-soil Interaction, with Linear and Nonlinear Soil Behavior Models"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 15-31

TEXT OF ENGLISH ABSTRACT: In structure-foundation-soil interaction analyses, it is very important to consider the structure stiffness with reasonable accuracy and to choose the appropriate model for the foundation soil. In this paper detailed studies of the mechanism of framed structure-foundation-soil interaction, as well as analyses of multistoried, multispan structures are given and comparisons are made with previous investigations from the foreign literature quoted. For the nonlinear stress-strain analysis, the hyperbolic stress-strain relationship of the Duncan-Chang model has been chosen. The triaxial tests were run on representative Shanghai soil samples to determine the soil parameters and finally, analysis of a multistoried, multispan structure with its foundation supported on such nonlinear soil has been worked out with promising results.

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TITLE: "Analysis of Two-segment Jibs of Tower Cranes"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 32-42

TEXT OF ENGLISH ABSTRACT: In this paper two-segment jibs of tower cranes with irregular guy arrangements and having various cross sectional shapes under the action of spaceforces were investigated, with due consideration to the effect of bending. The internal stresses, deformations and stability of the structure under the dead load, the wind load, the hoisted load and the braking forces were analyzed by means of the matrix displacement method.

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TITLE: "Nonlinear Analysis of Shear Behavior of Reinforced Concrete Beams by Finite Element Method"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 43-52

TEXT OF ENGLISH ABSTRACT: Based on the finite element method, a nonlinear analysis of reinforced concrete flexural members is presented in this paper.

The nonlinearity of behavior of concrete, continuously changing character due to crack propagation under monotonically increasing loads, effect of bond between steel and concrete were taken into account. During the analysis, concrete and tension steel were divided into triangular elements; compression steels and stirrups were divided into bar elements while the bond between concrete and tension steels was analyzed with the help of spring linkage elements.

We have developed a computer program that can be used to calculate the complete behavior, from zero load to failure, of a reinforced concrete flexural member under monotonically increasing loads. Some reinforced concrete simply-supported beams

[Continuation of TONGJI DAXUE XUEBAO No 4, 1981 pp 43-52]

with rectangular section, subjected to a two-point symmetrical transverse loading, were calculated by means of this program.

Computed deflections, crack patterns, ultimate loads and the failure mechanism show reasonable agreement with test results.

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TITLE: "Further Discussion of Two-step Polymerization"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 53-59

TEXT OF ENGLISH ABSTRACT: In this paper, the problem of two-step polymerization is treated with the non-steady state method. In accordance with the solutions of relative kinetic differential equations and the experimental results reported in the past, we obtain the following conclusion: The chief cause for the polymer generated in two-step polymerization being narrower than that produced in one-step polymerization is that during the interval of two processes of polymerization (i.e., the time of reserving the prepolymer), some impurities which can deactivate the active chains are exhausted, so that the molecular weight distribution of the polymer formed in the second step polymerization more closely approaches Gold's distribution, which is theoretically very narrow.

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TITLE: "The Ion Band Model of Superionic Conductors"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 60-70

TEXT OF ENGLISH ABSTRACT: As a result of periodic lattice potential of cage ions, the energy levels of mobile ions in superionic conductors are analogous to the band structure of electrons in semiconductors. The mobile ions in ionic conduction band contribute to ionic conductivity while ions of the same species in the ionic valence band do not. The ionic crystals and even some crystals with covalent bonds of a polar nature may be classified according to the width of ionic bandgaps. Most ionic crystals whose bandgap is too wide to allow ions to transit from VB into CB under thermal excitation at the temperature below their melting points will show no or only little ionic conductivity. Only a few of those with narrow bandgaps show appreciable ionic conductivity far below their melting points or even at room temperature and will be referred to as superionic conductors.

Arrhenius behavior of ionic conductivity which is analogous to that of electronic conductivity of semiconductors proves similar conductivity mechanism. In addition, the ion band of superionic conductors may also be used to explain other properties of superionic conductors, including phase transition, variation of ionic

[Continuation of TONGJI DAXUE XUEBAO No 4, 1981 pp 60-70]

conductivity with composition, etc.

Six different types of superionic conductors have been discussed in terms of the ion band model:

a. Intrinsic conductors, e.g., Ag^+ ion conductors.

b. Imperfect superionic conductors, e.g., superionic conductors with impurities as acceptors or donors and/or with interstitials and vacancies.

c. Superionic conductors with layer structure, e.g., β-Alumina.

d. Non-crystalline solid electrolytes.

e. Solid electrolytes with oriented dipoles, e.g., $LiX-Al_2O_3$, etc.

f. Electron-ion mixed conductors.

In dealing with the solid electrolytes with oriented dipoles, a comparison has been made of solid electrolytes with molten salts and electrolytic solutions. They can be expected to be treated by means of the ion band model in a unified way.

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TITLE: "Environmental Implication of Sedimentary Anticlines and Other Fabrics of the Pleistocene Biosparites on Shidao Island of the Xisha Archipelago"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 71-79

TEXT OF ENGLISH ABSTRACT: In the pleistocene biosparites on Shidao Island of the Xisha Archipelago, forms of small anticlines, which were found previously, originated from sedimentation and do not belong to the products of disjunctive and plicative dislocations as some people have thought. They reflect original occurrence of littoral sediments in situ. Detailed studies of the various fabrics and paleontologies show that the pleistocene biosparites are the complex of beaches, sand spits, barriers and dunes subfacies of the carbonate sand cay facies on the sublittoral table reef in the open sea. The depositional features and environmental interpretation of this region are worthy of consideration in the investigation of similar cases.

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TITLE: "The Surface Textures of Quartz Grains on Putuo Island of the Zhoushan Archipelago"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 80-85

TEXT OF ENGLISH ABSTRACT: This is a new technique using the scanning electron microscope to study the surface textures of quartz grains. When quartz grains undergo the abrasion, solution and precipitation, there will be various textures on their surfaces. According to the texture's pattern and probability, we can suggest the environment of the sediment.

The Hundred-Step Sand and Thousand-Step Sand are two kinds of sand coasts on Putuo Island. We observed 15 samples collected from the supratidal zone to subtidal zone of these two sand coasts and have discovered that the surface textures among them differ from each other. In the high-energy supratidal zone and the upper intertidal zone, the conchoidal breakage, dish pits and V-shaped pits are the major textures. In the low-energy subtidal zone the solution-precipitation of chemical action is a key factor. Solution depressions and upturned plates are formed. According to the above features, the combination of quartz surface textures can be used as auxiliary criterion of subfacies.

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TITLE: "Drawing Axonometries and Perspectives with the Computer"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 86-97

TEXT OF ENGLISH ABSTRACT: This article introduces how to turn a picture into digital information by using the matrix transformation mathematical method. Thus, the computer will set the autographic attachment working, showing on the terminal or on the design paper various axonometries or perspectives from different angles to be checked or revised in designing.

In this article, examples are given to show the programming of drawing the axonometries of a solid body as well as the perspectives of a house, both rotating about the vertical axis. Figures are enclosed respectively.

AUTHOR: HE Hucang [0149 6233 0221]

ORG: Class of 1977, Industrial Automation Specialty, Department of Electrical Engineering

TITLE: "A Study of Breakaway Points and Saddle Points on the Root Loci of the Characteristic Equation"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 98-106

TEXT OF ENGLISH ABSTRACT: Based on studies already made of breakaway points and saddle points on the root loci of the characteristic equation, this paper makes a further study of the problem by introducing two new subsidiary concepts about "isomorphic root loci" and "inverse root loci" and has drawn some useful conclusions.

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TITLE: "A Primary Study on the Counter Deflection Steel Structure"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 107-111

TEXT OF ENGLISH ABSTRACT: The counter deflection structure is a newly proposed steel structure especially suitable for that which is mainly subjected to bending load. The initial stresses composing a counter bending moment were stored in each section of the structural member by the so-called counter deflection process without any additional material before loading, thereby greatly raising the ultimate strength of the member against bending moment. It seems theoretically that the counter deflection structure may have twice the bending strength as a conventional structure, so that it has great economical meaning for practical purposes.

AUTHOR: ZHU Longgen [4376 7893 2704]
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TITLE: "Dynamic Force Transducer--Type TDJ-30"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 4, 1981 pp 112-118

TEXT OF ENGLISH ABSTRACT: The dynamic force transducer type TDj-30 is designed to measure dynamic forces. It is a small permanent preloaded transducer, having a range of 30 kg tensile to 30 kg compressive. With a load of 5 grams mounted on its top, the resonant frequency is over 8.5 KHz. When connected to a vibration exciter, the transducer can be used to measure and control the applied dynamic forces, and when used together with an accelerometer it can also determine mechanical impedance. Its principle, construction, characteristics and instructions are all given in this paper.

9717
CSO: 4009/210

Engineering

AUTHOR: WANG Guangyuan [3769 0342 6678]
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ORG: Both of the Harbin Civil Engineering Institute

TITLE: "Feasibility of Fully Stressed Solution of Statically Indeterminate Trusses"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 427-434

TEXT OF ENGLISH ABSTRACT: In this paper the concepts of full stress degree and ill-conditioning bars of structures are proposed and the feasibility theorems of a fully stressed solution for statically indeterminate trusses are presented. Errors and drawbacks of existing conclusions are also pointed out.

AUTHOR: WU Jike [2976 7139 0668]

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TITLE: "A Proof of Ellipticity of Thin Shell Equations"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 435-444

TEXT OF ENGLISH ABSTRACT: We have proved, under rather general conditions, that the system of linear differential equations for the elastic shell is of the elliptic type, i.e., we have proved the inequality $U(u, u) \geq \mu \|u\|^2$. It is shown that this inequality holds not only when the Gaussian curvature of the middle surface of the shell is positive, but also when the curvature is negative, zero, or even when its sign is variable. This inequality is important in proving the existence theorem of the solution for thin shells, and also for proving the convergence of various kinds of approximate methods.

AUTHOR: TANG Renji [3282 0117 1015]
JIANG Zhuzhong [5592 2691 0022]

ORG: Both of Lanzhou University

TITLE: "An Analysis of Radial Crack System on a Finite Circular Plate"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 445-458

TEXT OF ENGLISH ABSTRACT: In the present paper we make a study of the radial crack system on a finite circular plate based on the authors' own work and N. I. Muskhelishvili's complex potential method. Fundamental solutions of stress for a single crack are obtained. By means of these solutions we simultaneously give a general method for solving the above crack system. In order to illustrate the use of this method, we have calculated several examples using the numerical method of singular integral equations and the Gauss-Chebyshev integration formulas. The numerical results are given in graphs which show the variation of stress intensity factors with the inclined angles of the force and the geometric forms of cracks. The results obtained can be used for practice in engineering.

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ORG: Beijing University

TITLE: "Modified Solution for Structure Analysis by Finite Element Method"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 459-467

TEXT OF ENGLISH ABSTRACT: This article presents a modified solution for structure analysis by the finite element method. The finite element method solution in the structure may be regarded as one which is satisfied with the homogeneous differential equation segment by segment (or piece by piece). To the above-mentioned solution is added a special solution, satisfied with a fixed boundary condition segment by segment (or piece by piece). The modified solution obtained is an exact one for a structure of beams and bars and the precision is obviously improved for a structure of plates.

AUTHOR: HE Dazhuo

ORG: None

TITLE: "A Treatment of Substructures of Revolution with Discrete Boundary Nodes"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 468-476

TEXT OF ENGLISH ABSTRACT: Difficulty is encountered when using the semi-analytical method of Fourier expansion for solving axisymmetric substructures with discrete supports. In this study a transform matrix between continuous Fourier coordinates and discrete nodal coordinates is derived by using the principle of minimum potential energy and the Lagrange multiplier technique. Therefore, the matrices for boundary properties which have been evaluated in Fourier coordinates may easily be transformed to those in nodal coordinates. In the case where the boundary nodes are uniformly distributed on the circle, the calculation may be further reduced when a discrete Fourier coordinate system is used.

AUTHOR: CAO Zhiyuan [2580 1807 6678]

ORG: Institute of Engineering Mechanics, Chinese Academy of Sciences

TITLE: "The Solution of Composite Plates by Equivalent Non-classical Theory"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 477-490

TEXT OF ENGLISH ABSTRACT: In this paper various composite plates, including the combined, sandwich, laminated, composite material plates, etc., which are heterogeneous along the thickness by reason of construction or material, are transformed to the unitized equivalent homogeneous anisotropicplate solved by non-classical theory. The governing equation, its solution, the effect of coefficients of non-classical theory and equivalent transformation relations of various composite plates are given, the analytical solution of the problem is obtained, and a simple and practical computing method for the engineering calculation of composite plates is presented.

AUTHOR: ZHANG Fufan [1728 4395 5400]

ORG: Qinghua University

TITLE: "Rectangular Plates with Two Adjacent Edges Clamped and Two Other Adjacent Edges Free"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 491-502

TEXT OF ENGLISH ABSTRACT: This paper gives an exact solution for a rectangular plate, two adjacent edges of which are clamped and the other two are free. Two problems are solved, one a uniformly-loaded plate and the other for a concentrated-load in the free corner. Numerical solutions are worked out for a square plate, including the deflections in the free corner and along the free edges and bending moments distributed along the clamped edges. This method proposed presents no difficulty in making further calculations for the deflections, bending moments, twisting moments and shearing forces at any point of the plate by superposition, and can easily be extended to the cases in which there may be any kind of loading along the free edge, including a twisting moment.

AUTHOR: CUI Zhenyuan [1508 2182 3293]
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ORG: Both of Northwestern Polytechnical University

TITLE: "A Boundary Collocation Technique for Evaluating the Torsional Rigidity and Third Stress Intensity Factor of Cracked Bars"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 503-511

TEXT OF ENGLISH ABSTRACT: In this paper a boundary collocation technique is proposed for evaluating the torsional rigidity and the third stress intensity factor of cracked bars. The proposed eigen-function expansion form is quite different from Sih's in that it is convenient both for evaluating the torsional rigidity and third stress intensity factor.

The three cases considered in this paper are the cracked rectangualr section, the cracked round section and the cracked angular section. The numerical results for the torsional rigidity and third stress intensity factor are shown.

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TITLE: "Piecewist Spline Functions Method Applied to Holographic Strain Analysis"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 526-530

TEXT OF ENGLISH ABSTRACT: The method described in this paper which uses piecewise spline functions for determining holographic strain is an explicit algorithm and can solve a system of linear equations without boundary conditions. It can be used for studying those problems whose boundary conditions are not specified. Taking the cantilever beam as an example, the fit accuracies are analyzed by simulating holographic data and calculating on a computer. The fit accuracies are compared with those of Taylor's spline method.

AUTHOR: LI Guochen [2621 0948 3819]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Creep Buckling of Circular Shells under Bending"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 554-562

TEXT OF ENGLISH ABSTRACT: By using the specific stress strain method proposed by the author, creep buckling of circular shells under bending is analyzed. Theoretical results agree with the tendency of known test results satisfactorily. In view of the characteristics of creep buckling, the author suggests that for engineering design it is more desirable to determine the allowable loading stress according to the critical time required than to predict the working life with stress given as is usually done.

AUTHOR: LUO Zhiying [5012 3112 5391]
WEI Xianxiang [7614 0341 4382]

ORG: Both of Lanzhou Railway Institute

TITLE: "A Discussion on Some Problems with Energy Theorems"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 4, 1981 pp 563-571

TEXT OF ENGLISH ABSTRACT: Some comments on problems concerning energy theorems, especially on the principle of virtual work, which can be found in the solid mechanic literature, including a number of mechanics texts, are made in this paper, in which the authors try to develop their analysis mainly by clarifying the fundamental physical concepts rather than working through mathematics, and to demonstrate the unification and continuity of the views on the energy theorems in various mechanics courses.

9717
CSO: 4009/209

AUTHOR: LIU Guangyao [0491 0342 1031]
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ORG: LIU of Research Institute of Survey Science and Technology, Ministry of Metallurgy; PAN of Nanjing Optical Instrument Component Plant No 2

TITLE: "Research and Manufacture of the HCF-5050 Stereoscan Reader-Interpreter"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 6, 22 Nov 81 pp 41-42

ABSTRACT: The HCF-5050 stereoscan reader-interpreter is a routine instrument suitable for interpreting large scale aerial photographs and for making outline images at the same time. In view of the fact that 1/50000 aerial photos are generally available in China but large scale photos may have to be taken all over again for the purpose of composing large scale maps. As aerial photos contain targets smaller than the resolution factor of the naked eye, it is only logical that if aerial photos are enlarged 4-5 times, more information may be obtained from them. Through a cooperative effort of the Research Institute of Survey Science and Technology and the Nanjing Optical Instrument Component Plant, the HCF-5050 Stereoscan reader-interpreter was successfully produced. It was well received by the delegates to its certification conference held in Baoding City of Hebei Province on 22-24 Jun. The optical theory, the technical indices, and properties of this instrument are introduced. There is also a photo of the instrument and a drawing depicting the optical paths.

6248
CSO: 4009/218

AUTHOR: LIU Yiyuan [0491 6654 0954]

ORG: None

TITLE: "Construction Geology Work of a Certain Underground Water Seal Rock Cave Oil Depot"

SOURCE: Chongqing DIXIE GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 11, 11 Nov 81 pp 9-13, 5

ABSTRACT: Survey for the underground oil depot officially began in Sep 75 and the construction was scheduled to be completed in Sep 77. There were delays and the project was not completed until the end of 1980. Based upon the experience, the author suggests that holes should be arranged and drilled for the purpose of long term observation of ground water movement instead of using the holes designed for monitoring the stored oil. He also stresses the need for more thorough geological survey before construction. Although construction geology work is indispensable, it should only be for redressing possible omissions and mistakes. If the construction workers had coordinated with the construction geologists more fully and had respected the original design, many problems encountered during construction of this project could have been avoided. The quality of the oil depot could have been better and the cost and the duration of construction greatly reduced. The geological and hydro-geological condition of this first underground water seal rock cave oil depot in China is generally described and the problems during construction are briefly discussed. The location of the oil depot is not named.

6248
CSO: 4009/214

AUTHOR: QIU Xin [3061 2450]

ORG: None

TITLE: "Semi-automatic Large Area Photoetching Machine"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 11, Nov 81 p 14

ABSTRACT: The KHA75-1 semi-automatic large area photoetching machine has been successfully made through joint research by Harbin Measurement and Cutting Tool Plant, Acheng Relay Device Plant, et al. It is an equipment for photoetching in the process of manufacturing high precision large and intermediate scale integrated circuits. It can accomplish such work procedures as hard contact, soft contact, close exposure, etc. New techniques, such as dual compound eye, nonspherical light exposure and condenser systems, vacuum duplicating, inductance read-out, dual eyepiece sighting, etc. are employed to improve the resolution, reduce the force of contact, and enlarge the visual field of this photoetching instrument. The instrument is suitable for silicon chips of a maximum size of ϕ75 mm. The resolution factor is 1μ. The microscopic magnification is 75-400 x. The light exposure time is 0.1-9.9 seconds. The instrument has been certified.

AUTHOR: SUN Yumin [1327 3022 2404]

ORG: None

TITLE: "Laser Tachometer"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 11, Nov 81 p 14

ABSTRACT: Most recently, the Shanghai 573 Plant successfully made a noncontact type JZY-2 laser tachometer. It may be used to measure the revolutions per minute or the angular speed of the rotating shaft of airplane engines, gas turbines, electrical motors, or other high speed rotational bodies. Besides, it may also be used to measure the frequency of high speed periodically revolving bodies. It may be operated under adverse conditions and will not affect the state of the body being measured. It can work at a distance of 10 m, to a rotational speed of 60000 revolutions/minute, at a precision of 0.1 percent. With some minor change, it may also be used as an instrument to monitor rotational speed. The size of the instrument is small; its properties are reliable. Its operation is simple and convenient. All that is necessary is to aim the laser at a prescribed region of the object being measured and the operator can read the number of rotations directly from the numeric code tube.

6248
CSO: 4009/217

AUTHOR: WANG Susheng [3769 5685 3932]

ORG: Shanghai China Textile Machinery Plant

TITLE: "On the Method of Reconstructing the Flow-line of China's Jolt-squeeze Molding Machine"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 11, 20 Nov 81 pp 7-9

ABSTRACT: The production flow-line of the jolt-squeeze molding machine established and extended in China in the 50's is very backward compared with the advanced level of foreign countries and it can no longer meet the need of casting superior quality products in the future. The author gathered, studied, and analyzed a large quantity of foreign technical information. After comparing the advantages and shortcomings of various types of molding machines, he believes that the Hunt type molding machine is the most suitable direction for reconstructing and modernizing the flow-line of China's jolt-squeeze machines. There will be no need of basic construction or additional equipment. The reconstruction involves only the work process and accessory equipment while the potential of the currently available production line may be fully exploited, and the labor intensity and the work environment improved. With a simplified structural diagram, the characteristic of the structure and the flow-line of the Hunt molding machine are introduced. Its technical parameters, work procedure, and merits are explained. Four methods of reconstructing the existing flow-line for using the Hunt molding machine and the jolt-squeeze machine together so as to retire the old machine gradually are described.

AUTHOR: SHI Hanliang [2457 3352 5328]

ORG: Shanghai Rubber Machinery Plant No 1

TITLE: "ZS-14 Special Use Deep Hole Drill"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 11, 20 Nov 81 pp 17-18

ABSTRACT: Small caliber deep hole drilling is a difficult job in machine processing. In producing rubber machines, it is frequently necessary to drill 13 deep holes of ϕ27mm in A3 steel plates. The difficulty of making this component had always been the reason for the Shanghai Rubber Machinery Plant No 1 to be unable to increase the production of this machine. The author and colleagues designed and made the ZS-14 deep hole drilling machine for the special use of making this component. It can process 14 deep holes (having one spare bit) in one operation. The drilling machine has now been in operation for more than one year and it takes a little over 2 hours to finish all 13 holes at once. The structure of the drilling machine, the major parameters, and the essential operating procedure are explained.

624
CSO: 4009/215

Machine Tools

AUTHOR: None

ORG: None

TITLE: "Beijing Machine Tool No 1 Succeeds in Making the XKD 2012/14 Numeric Control Mobile Milling Planer"

SOURCE: Beijing JICHUANG [MACHINE TOOL] in Chinese No 12, Dec 81 p 45

ABSTRACT: Special characteristics of the milling planer described in the paper include its high degree of automation. It is equipped with a B_1K-215 computer, capable of controlling 5-axle joint movements. The total external size of the 2-connected segments of the machine is 13,360 mm x 7,800 mm x 3,685 mm. The height below the cross beam is 560 mm and the machine weighs 36,000 kg. The range of movement of the longitudinal coordinate X is 8 M; that of the latitudinal coordinate Y is 1.25M; and that of the vertical coordinate Z is 0.5M. The range of rotation of the major axle is 1000-6000 cycles/minute. The compound milling precision is within ±0.10mm; the smoothness reaches ▽5. In this period of readjustment of the national economy, the Beijing Machine Tool Plant No 1 urgently improved its operating system and developed scientific research work so that the design of this machine took only 3 months, work preparation 2 months, and assembly and testing one year. This is an important special equipment for the department of aviation industry to process airplane parts. Its successful manufacture will contribute a great deal to China's aviation industry as well as save a great deal of foreign exchange for the state.

AUTHOR: XIAN Qin [0103 3830]

ORG: None

TITLE: "Opening Up Sales and Applications of Numeric Control Machine Tools in The Process of Their Usage"

SOURCE: Beijing JICHUANG [MACHINE TOOL] in Chinese No 12, Dec 81 p 45

ABSTRACT: The Shanghai Machine Tool Plant No 4 established a numeric control application group. Currently, the group has 14 members, with 7 numeric control machine tools of 4 different types at their disposal. They use these tools to finish such parts as cams, bearing seats, trestles, etc. for the products of the plant itself as well as nearly hundred different types of parts for outside units. With these tools, they are able to process these items of better quality in less than half of the time needed with the old tools. Through the work of this group, the plant has been able to demonstrate that these numeric control machine tools are reliable and have stable precision. The customers of this group have many special parts to produce. When they are convinced that numeric control tools can make the work easier, faster, etc. they will purchase the tools for themselves. This demonstration through production is, therefore, an effective way of extending the numeric control technology and of selling numeric control machine tools.

6248
CSO: 4009/211

AUTHOR: TONG Wenfu [0157 2429 3940]

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TITLE: "Application of PS Plates in China and Analysis of Problems in the Application Process"

SOURCE: Beijing YINSHUA JISHU [PRINTING TECHNOLOGY] in Chinese No 6, Dec 81 pp 53-55

ABSTRACT: In China the research on PS [presensitized] plates began in 1973 and some progress has been made since then. Now, several tens of plants in a dozen provinces (cities) are experimenting with or applying this technology of offset plate making. Experimental manufacture of the photosensitive layer and negative [inversion] image plates (not yet in production) have begun and some [deep-etch plates] have life-spans of 300,000 copies (fine prints) or 760,000 copies (single color prints.] There are only 2-3 types of photosensitive coating materials, however and because of the fact that their manufacturing equipment is too simple, the products are not sufficiently stable. The light exposure time is too long and the alkaline tolerance is also very poor. After light exposure, the color of the photosensitive layer has a tendency to change and insufficient light exposure time often causes smudges on the plate. The developing agent loses effect much too fast and is easily contaminated by the dye. After drying, streaks where the ink is missing often occur or there may be smudges all over the plate or in some places. The paper lists 14 problems and suggests various techniques of overcoming these difficulties.

6248
CSO: 4009/216

AUTHOR: ZHANG Jingming [1728 2417 2494]
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TITLE: "Study of Near Field Spectrum of GaAs-$Al_{0.3}Ga_{0.7}As$ DH Lasers"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 1, 1982 pp 1-7

TEXT OF ENGLISH ABSTRACT: Investigations have been made on near field spectrum, near field intensity distribution at different wavelengths, *L-I* characteristics of different wavelengths and of different spatial positions. The results show that the kinks behavior of the *L-I* curve and multiple groups of longitudinal mode are attributed to non-uniform distribution of Al composition in the active area. Explanations of mode-competition and light pulsation observed are given.

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TITLE: "Highly Efficient Coupling between DH Laser and Fiber"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 1, 1982 pp 15-22

TEXT OF ENGLISH ABSTRACT: The efficiency of coupling between DH lasers and tapered launchers with single core, clad-core and double core has been calculated by using the skew ray tracing technique. Some packaged DH laser devices have been fabricated, and the optical power output from the fiber of some of these devices is up to 11.4 mW (coupling efficiency of 92 percent). A sample device with optical feedback split light from the front surface of the laser to stabilize power output has also been fabricated.

AUTHOR: ZHENG Youdou [6774 2589 3499/2435]
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ORG: Both of the Department of Physics, Nanjing University

TITLE: "Radiation Damage in MOS Structures by Soft X-ray Irradiation"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 1, 1982 pp 55-61

TEXT OF ENGLISH ABSTRACT: This paper presents the results of an investigation of radiation damage in MOS structures exposed to soft X-ray irradiation. It is shown that soft X-ray irradiation causes the formation of electron and neutral traps in the oxide bulk, as well as the build-up of positive charge and interface states at the SiO_2-Si interface. The results of annealing of radiation damage are described.

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